BBSS: Tuning the Radiosonde

I. Purpose:

The purpose of this procedure is to describe to RESET and weather observers how to tune radiosondes during IOPs and other occasions when it may be necessary to select frequencies away from other sondes or interference.

II. Cautions and Hazards:

- Do not touch the sensors.

III. Requirements:

- Operating Radiosonde RS80 or RS90
- Operating DigiCORA
- Jeweler's screwdriver

IV. Procedure:

A. Steps:

1. Tune Radiosonde, following the DigiCORA manual's procedure in "B. Tuning the Transmission Frequency of the Radiosonde" on page 23, stored near an operating DigiCORA.
2. Follow this procedure, section C, Receiver Tuning; press **TELEM** key and make sure the system is operating in **Afc** mode (also see DigiCORA manual, page 24).
3. Observe the frequency change associated with small turns of tuning screw in Radiosonde.
4. Tune sonde to desired frequency, and follow BBSS launch operating procedures.

   Note: The battery is now ready for use.

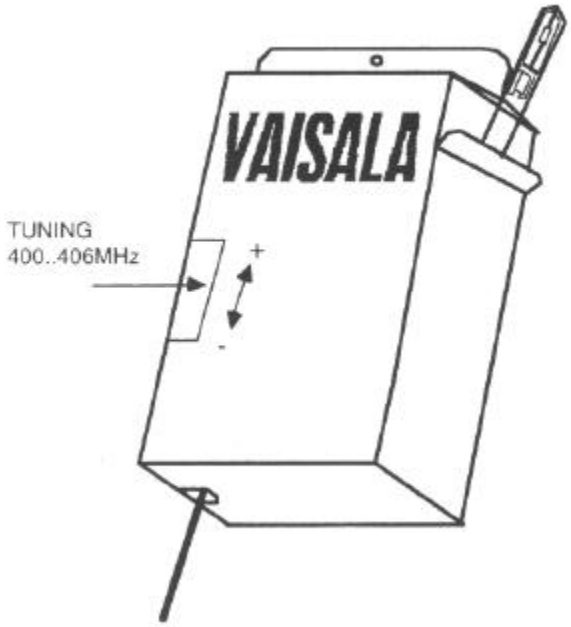
B. Tuning the Transmission Frequency of the Radiosonde:

NOTE: All the radiosondes are tuned at the factory to a frequency of 403 MHz. If you cannot use the factory tuned frequency; it can be changed by turning a tuning screw underneath the cover. Plus (**+**) and minus (**-**) signs are marked on the cover.

1. Bend the flap back to reach the tuning screw.

2. Turn the screw clockwise (toward the minus [**-**] mark) to decrease the frequency and counterclockwise (toward the plus [**+**] mark) to increase the frequency.

   Note: Be careful not to tune too far; proceed very slowly to avoid going outside the band.

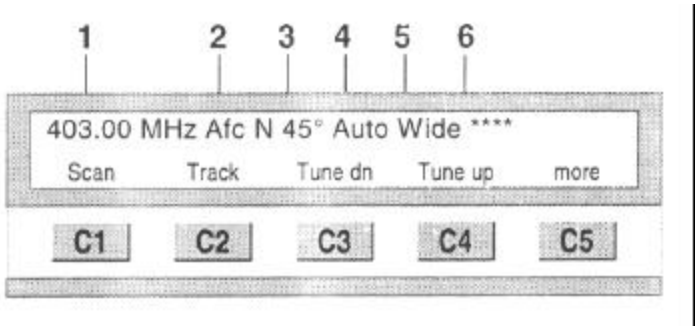


Note: A more detailed description of the radiosonde is given in the Instruction Manual for the RS80 Radiosonde and WS80 Windsonde and Operating Manual for GPS Radiosondes.

C. Receiver Tuning:

Telemetry Mode

NOTE: When the TELEM key is pressed the console enters the telemetry mode and the system receiver is ready for tuning. The following text and menu are displayed:



Upper line shows the different fields available.
Lower line shows the command menu available for tuning.

Field 1 Radiosonde frequency:

Factory set at 403 MHz; can be retuned if necessary.

Field 2 Frequency control mode:

Afc	automatic frequency control
Scan	tuner scan for radiosonde signal
Track	signal tracking (**Afc** but quicker)
Tune	manual receiver tuning up pr down, receiver blocking at a fixed frequency

Field 3 Antenna direction:
Azimuth and elevation setting

Field 4 Antenna directing mode:

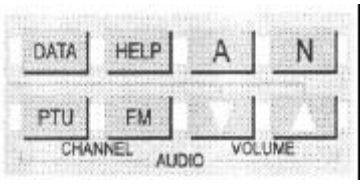
Man	manual setting of antenna direction
Auto	automatic search for best antenna orientation

Field 5 IF bands:

Wide	**IF** bandwidth of 200 kHz
Narrow	**IF** bandwidth of 50 kHz

Field 6 Radiosonde signal field strength:
“From none to five stars, ... ***** depending on reception.”

Functions of the **AUDIO** keys:



▽ △	Adjust the audio monitoring level (four steps).
▽ + ENTER	Toggle ON/OFF the present key beep signal and internal battery alarm.
PTU	Audio monitoring of filtered PTU signals which are converted down by a factor of 8.
FM	Audio monitoring of detected radiosonde signals.

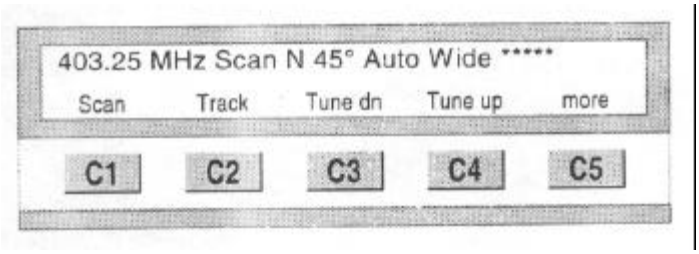
Note: The typical sound from the radiosonde should be heard clearly; if not, some other unwanted signal might be picked up instead, possibly from a telecommunication link, television set, etc.

Observe the tuning all throughout the sounding operation.

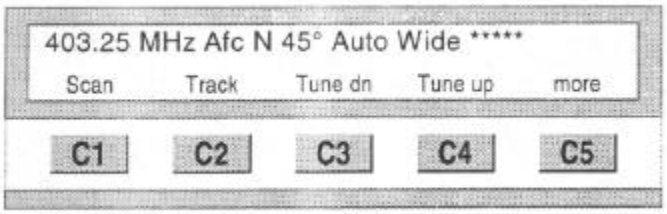
<u>Scan, Track, Tune up, Tune dn</u>

Note: In case no signal can be heard, no stars shown at the start (for instance with a retuned radiosonde), proceed in the manner outlined below:

1. Press the **C1** key, **Scan**. (The tuner enters the Scan mode and starts to scan the allocated frequency band for the radiosonde signal.)

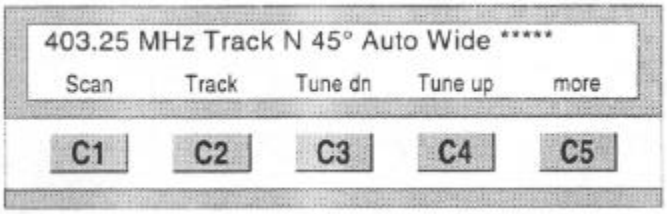


Note: When the signal has been found the receiver is locked in on this frequency. The scan operation stops automatically and the Afc is reconnected.



Note: The **Afc** takes over and the receiver tuner follows the radiosonde signal. However, the signal may be lost if the frequency changes rapidly. If so, the receiver will remain at the frequency where the signal was lost.

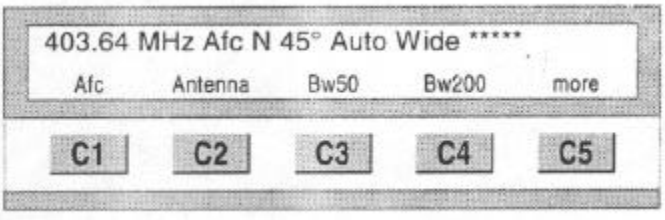
2. Press the **C2** key, **Track** (seldom necessary).



Note: The radiosonde signal is tracked in a frequency window of ±1 MHz of the receiver frequency at the instant of pressing the Track key. This tracking operation is similar to the **Afc** but quicker and with a wider searching range.

3. Press the **C1/C2** key once more to stop Scan/Track.
4. Manual fine adjustment of frequency: Press the **C3** key; tune up to increase the frequency.
5. Press the **C4** key; tune down (**dn**) to decrease the frequency.
6. For more control of telemetry operation: Press the **C5** key, more.

Note: The second line of the display changes and the following selection menu is shown:



Automatic Frequency Control and Bandwidth Selection

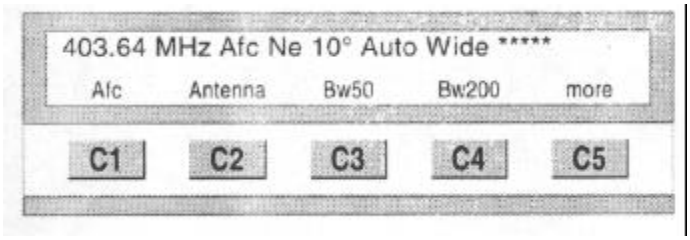
7. Press the **C1** key, **Afc**.

   Note: The **Afc** is taken off and the receiver is blocked at the frequency where it happened to be when the **Afc** key was pressed. The **Afc** off mode may be used in rare cases where the radiosonde signal is so close to another source as to risk the **Afc** picking up a wrong signal and following this instead of the radiosonde signal.

   Normally when the receiver was tuned to the desired radiosonde frequency, ensure that the **Afc** remains on (at this stage by pressing the **C1** key, **Afc**, once more) to allow listening to the radiosonde.

8. Press the **C2** key, **Antenna**.

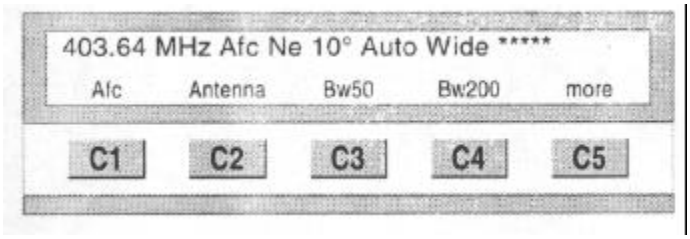
   Note: The following display appears on the screen to indicate manual antenna control mode. With the RB20 directional antenna, this allows the user to choose antenna elevation and azimuth using the **ANTENNA/CURSOR** keys.



   Note: It is advisable to use automatic antenna control mode to get the strongest signal reception.

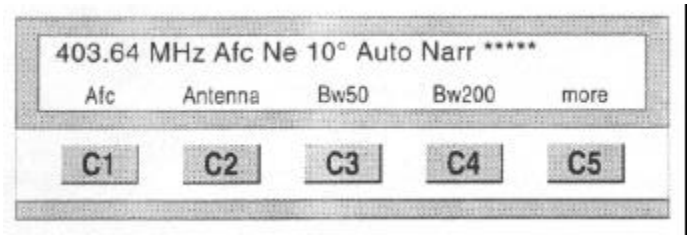
   Note: When using omnidirectional antennas the Antenna Control has no effect on the operation.

9. Press the **C2** key, **Antenna**, again to return to the original (Auto) antenna control mode.

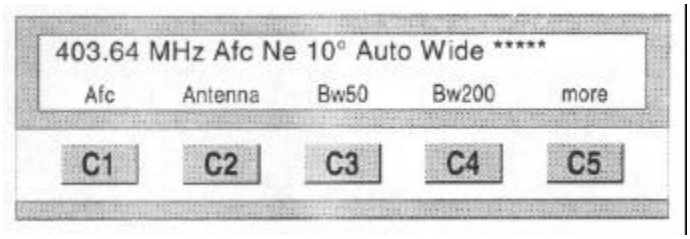


10. Press the **C3** key, **Bw50**.

    The following display indicates the narrow IF band (50 kHz), which is used with narrow-band radiosondes.



11. Press the **C4** key to return to the wide **IF** band (200 kHz) operating mode.
12. Press the **C5** key, more, to get back to the first command menu.



13. Press **TELEM** or **CMD** to change mode.

V. References:

1. DigiCORA II MW15 Operating Procedure Manual, Vaisala, 1998-02-25.

2. BBSS - TWP Balloon\Borne Sounding System Launch Operation, PRO(BBSS) - 220.000 (1997)

VI. Attachments:

None.